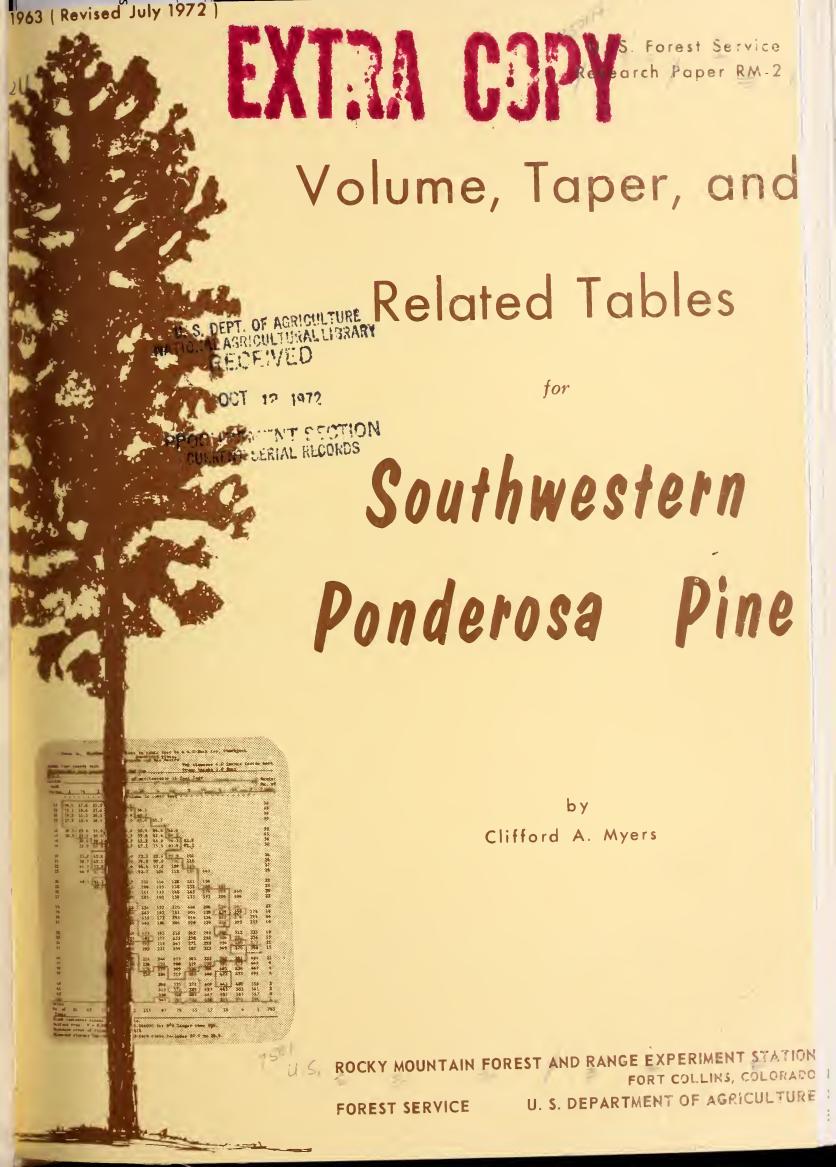**Historic, Archive Document**

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Volume, Taper, and

Related Tables

for

Southwestern

Ponderosa Pine

by

Clifford A. Myers

ABSTRACT

Presents volume tables, taper tables, and the distribu-
tion of tree volumes among the logs of saw log trees.
Volumes are in total cubic feet and cubic feet to a
variable top. Tree heights are in feet and numbers of
logs.

Keywords: *Pinus ponderosa*, forest measurement, tree
    volume tables.

VOLUME, TAPER AND RELATED TABLES

FOR

SOUTHWESTERN PONDEROSA PINE

by

Clifford A. Myers, Research Forester

Rocky Mountain Forest and Range Experiment Station[1]

[1] Central headquarters maintained in cooperation with Colorado State University at Fort Collins.

LIST OF TABLES

VOLUME, TAPER, AND RELATED TABLES FOR

SOUTHWESTERN PONDEROSA PINE

by

Clifford A. Myers

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INTRODUCTION

The tables presented here give the basic mensurational values needed to measure ponderosa pines (Pinus ponderosa Laws.) in Arizona and New Mexico. They provide timber cruisers and growth estimators with the following:

1. Volumes in cubic feet to various limits of utilization.

2. Volumes in board feet, International 1/4-inch and Scribner log rules.

3. Scaling diameters of each log in trees of various diameter and merchantable height classes.

4. Distribution of board-foot volume among the logs of a tree.

5. Volumes of merchantable top wood as percentages of merchantable cubic feet to a 4.0-inch top.

Sample trees were measured in all areas of commercial ponderosa pine in Arizona and New Mexico.[2] Standards conformed to the needs of Forest Survey and the National Forests of the Southwestern Region.

Separate volume and taper tables were prepared for blackjack and old-growth ponderosa pines. Blackjacks and old-growth pines of equal diameter and height differ in taper and volume.[3] Blackjack pines are immature or young mature trees with dark bark and relatively rapid taper. Old-growth pines have yellowish bark, often in broad, flat plates, and less taper than blackjacks. Trees in these two groups have been tallied separately in cruising and other measurement work in the Southwest for many years.

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[2] Field measurements were made by personnel of the Southwestern Region, U. S. Forest Service, under the direction of Mr. Frank Bell.
[3] Hornibrook, Ezra M. Scribner volume tables for cut-over stands of ponderosa pine in Arizona. Jour. Agr. Res. 52: 961-974. 1936.

DEFINITIONS AND STANDARDS

Definitions of variables used in the tables, and of standards followed in field measurement and computations are as follows:

Diameter breast high (d. b. h.). --Measured to 0. 1 inch outside bark 4. 5 feet above ground level at the uphill side of the tree. Full-inch diameter classes, with class mid-points at the half-inch marks, were used in the tables (12. 5, 13. 5, etc.).

Scaling diameter of logs. --Average diameter inside bark to 0. 1 inch, measured at the upper (small) end of logs or half-logs. Saw log dia-meter classes followed conventional scaling practice with the class mid-points at even inches (8. 0, 9. 0, etc.).

Minimum top diameter of sawtimber trees. --Diameter inside bark that represents average full saw log uti-lization of Southwestern ponderosa pine. Logs with a scaling diameter less than 7. 6 inches (8-inch class) were not included in saw log volume, which conforms to the practice in most of Arizona and New Mexico. The average minimum top diameters, inside bark, used in computing tree volumes were:

Tree d. b. h. (Inches)	Minimum top saw log diameter (Inches)
12 -13	8
14 -21	9
22 -26	10
27 -31	11
32 -35	12
36 -39	13
40 -42	14
43 -45	15
46 -47	16

Total height. --Measured from ground level at the uphill side of the tree upward to the tip. Forked, stag-topped, or other deformed trees were not included in the sample. Midpoints of the total height classes used in the tables were multiples of 10.0 feet.

Height in logs. --Measured from the top of a stump 1.0 foot high upward to the limit of saw log utilization. Each tree was divided into as many standard 16.5-foot-long logs as possible. An additional half-log, if present, was taken from the uppermost part of the merchantable length. Portions of the bole above the height of minimum top saw log diameter were included in the uppermost saw log if the standard length of the log or half-log ended within 4.0 feet above this height. This was done to avoid biased negative error in volumes[4] and positive error in top diameter averages.

EXPLANATION OF TABLES

The general definitions and standards given apply to all tables. Explanation of each type of table and suggestions for use are presented here.

VOLUME TABLES

Headings and footnotes with each volume table (tables 1a-8b) give the volume unit, type of height measurement, and utilization standards used in its compilation. Ten-foot or half-log height classes and full-inch diameter classes were used in all tables.

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[4] Chapman, Herman H., and Meyer, Walter H. Rules for measuring standard merchantable heights, p. 92. In Forest Mensuration. 522 pp., illus. New York: McGraw-Hill Book Co. 1950.

The volume tables were derived from linear regressions in V and D^2H, given in the footnotes, of the form:

$$V = a + b\, D^2H, \text{ where:}$$

V = gross volume in the appropriate unit
D = diameter breast high outside bark
H = total height in feet or merchantable height in logs
a, b = regression constants

Equations for cubic volumes of sawtimber trees, with heights in feet, apply over the full range of the basic data. Other equations correctly expressed the relationship between volume and D^2H except for the smallest trees or the lowest values of D^2H. Tabular volumes for values of D^2H below the limits given with these equations were determined directly from the basic data as separate linear relationships.

The number of logs in a tree shown in the tables is not necessarily the number that will actually be cut from it. Instead, it is the number of logs between the stump and the height where minimum top diameter is reached. To locate the minimum top, the "4-foot rule" explained on page 2 should be used.

Volume of nonmerchantable logs below the height of minimum top diameter should be deducted according to the percentages in table 10, not by tallying fewer logs in the tree. For example, assume that a sound blackjack 30 inches in diameter has a bole length of 82.5 feet (5 logs) between the stump and the height where diameter inside bark is 11 inches. The tree has a gross volume of 1,344 board feet Scribner rule (table 6a). The top log is too limby to send to the sawmill. This log contains 4 percent of the board feet in the tree (table 10) and the other logs contain 96 percent. When 4 percent or 54 board feet is deducted, the tree contains 1,290 board feet. If the tree were tallied as a 30-inch, 4-log tree, it would be incorrectly credited with a volume of 1,065 board feet.

SCALING DIAMETERS OF LOGS IN A TREE

Tabulated scaling diameters (tables 9a, 9b) represent average tapers for the sample of trees measured. The range of tree diameters and heights is less than for the volume tables because too few trees were measured in some height and diameter classes to insure reliable averages.

Tree volumes obtained by summing the volumes of logs with the indicated scaling diameters will not equal tree volumes in the volume tables. Taper tables are constructed by averaging diameters at the taper points, while volume tables are based on averages of tree volumes. Tree volumes computed from the taper tables will usually differ from volume table values by less than 10 percent, however.

Top logs in the taper tables do not always have the minimum top scaling diameter appropriate for the size of tree. That is because the saw log trees were not utilized to a fixed top diameter, but in lengths that were multiples of 8.25 feet. For example, scaling diameters of top logs or half-logs of 20-inch blackjacks (table 9a)

range from 9 inches (4.5-log trees) to 11 inches (2-log trees). However, most sample trees 20 inches in diameter were utilized to a 9-inch top.

Despite these limitations, taper tables are useful tools for tree measurement. One use is for estimating volume by log-quality classes. The logs of a tree usually differ in grade, but this difference cannot be shown by the values in a volume table. If the scaling diameter and grade of each log of a tree is known, volumes in each log-quality class can be determined.

PERCENTAGE OF TREE BOARD-FOOT VOLUME IN EACH LOG

The board-foot volume in each log-quality class can also be determined with the percentages from table 10. Each line in the body of the table gives the distribution of volume among the logs of a tree of specified diameter and merchantable length. In 30-inch, 3-log trees, the butt log contains 57 percent of the board feet, the middle log contains 32 percent, and the top log 11 percent. A 30-inch, 3-log blackjack contains 785 board feet Scribner rule (table 6a). The volume of each log, from the butt upwards, is 448, 251, and 86 board feet. These amounts can be assigned to the proper log-quality classes.

An important use of table 10 has already been explained in the description of the volume tables. Nonmerchantable logs below the height of minimum top diameter should be deducted from tree volume by means of the percentages shown, not by tallying fewer logs in the tree.

The percentages in table 10 can be used for both old-growth and blackjack ponderosa pines, and with both the Scribner and International 1/4-inch log rules. Percentages for diameters that are not included can be obtained by interpolation.

CONVERSION FACTORS FOR VOLUME OF MERCHANTABLE TOPS

Wood 4.0 inches in diameter or larger inside bark that is not harvested for saw logs is often suitable for pulpwood. Top wood volumes can be computed directly by means of the appropriate volume tables (tables 2a, 4a; 2b, 4b) but it is sometimes more convenient to obtain them by converting other measures of volume.

The conversion factors (table 11) were obtained by determining for each tree the percent volume of sapwood from the formula:

$$\frac{\text{Volume from upper limit of utilization for saw logs to 4.0 inches d.i.b.}}{\text{Merchantable cubic-foot volume, stump to 4.0-inch top}} \times 100$$

The resulting percentages were then smoothed graphically.

Each conversion factor is the average percentage of merchantable cubic-foot volume (tables 2a, 2b, 3a, 3b) left in the tops after saw log harvest. For example, a stand containing 1,000 merchantable cubic feet of wood in old-growth trees 13.0 to 14.9 inches diameter has 1000×0.191 or 191 cubic feet of usable top wood.

Cubic feet inside bark
Entire stem including stump and top   Total height above ground

Diameter breast height outside bark (Inches)	Total height in feet													Basis: Trees
	20	30	40	50	60	70	80	90	100	110	120	130	140	
	- - - - - - - - - - - Volume in cubic feet - - - - - - - - - - - - - - -													No.
5	1.69	2.24	2.79	3.35										10
6	2.13	2.90	3.67	4.44	5.21									20
7	2.64	3.67	4.69	5.72	6.74									11
8	3.22	4.54	5.86	7.18	8.49	9.81								12
9	3.88	5.53	7.17	8.82	10.5	12.2								19
10	4.61	6.62	8.63	10.6	12.8	15.1								14
11	5.41	7.82	10.2	12.8	15.6	18.4	21.2							22
12	6.29	9.14	12.1	15.3	18.6	21.9	25.2	28.5						34
13		10.6	14.2	18.1	21.9	25.7	29.6	33.4						33
14		12.2	16.6	21.0	25.4	29.9	34.3	38.7	43.1					32
15		14.1	19.1	24.2	29.2	34.3	39.3	44.4	49.4					33
16			21.8	27.5	33.3	39.0	44.7	50.4	56.2					32
17			24.7	31.1	37.6	44.0	50.4	56.9	63.3	69.8				41
18			27.7	34.9	42.1	49.3	56.5	63.7	70.9	78.1				36
19			30.9	38.9	46.9	54.9	62.9	70.9	78.9	86.9				30
20			34.3	43.1	51.9	60.8	69.6	78.4	87.3	96.1				34
21				47.5	57.2	67.0	76.7	86.4	96.1	106				26
22				52.1	62.8	73.4	84.1	94.7	105	116				37
23				57.0	68.6	80.2	91.8	103	115	127	138			26
24				62.0	74.6	87.3	99.9	113	125	138	150			32
25					81.0	94.6	108	122	136	149	163	177		24
26					87.5	102	117	132	147	161	176	191	206	30
27					94.3	110	126	142	158	174	190	206	222	23
28					101	118	136	153	170	187	204	221	238	27
29					109	127	145	164	182	200	219	237	255	19
30					116	136	155	175	195	214	234	253	273	24
31					124	145	166	187	208	228	249	270	291	18
32					132	154	177	199	221	243	265	288	310	18
33					141	164	188	211	235	259	282	306	329	15
34						174	199	224	249	274	299	324	349	21
35						184	211	237	264	290	317	343	370	15
36						195	223	251	279	307	335	363	391	22
37						206	235	265	295	324	354	383	413	9
38						217	248	279	311	342	373	404	435	4
39							261	294	327	360	393	425	458	4
40								309	344	378	413	447	482	3
41								325	361	397	434	470	506	2
42								341	379	417	455	493	531	0
43								357	397	437	476	516	556	1
Basis: No. trees	2	23	39	70	105	115	139	127	103	58	16	12	4	813

Block indicates extent of basic data.
Derived from: V = 0.001824 D²H + 0.5870 for D²H to 6,000.
              V = 0.002103 D²H - 1.091458 for D²H larger than 6,000.
Standard error of estimate: ± 16.48 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 1b. --Volumes of entire stem in cubic feet, old-growth ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Entire stem including stump and top   Total height above ground

Diameter breast height outside bark (Inches)	Total height in feet											Basis: Trees
	40	50	60	70	80	90	100	110	120	130	140	
	- - - - - - - - - - - - Volume in cubic feet - - - - - - - - - - - - - - -											No.
12	14.0	17.6	21.2	24.8	28.4	32.0	35.6					21
13	16.4	20.6	24.8	29.0	33.2	37.4	41.6					25
14	19.0	23.8	28.6	33.5	38.3	43.2	48.0					18
15	21.7	27.3	32.8	38.3	43.8	49.4	54.9					26
16	24.7	30.9	37.2	43.5	49.7	56.0	62.3					28
17	27.8	34.8	41.9	48.9	56.0	63.0	70.1	77.1				30
18	31.1	39.0	46.9	54.7	62.6	70.5	78.4	86.3				24
19	34.6	43.4	52.1	60.9	69.6	78.4	87.1	95.9	105			27
20		48.0	57.6	67.3	77.0	86.7	96.3	106	116	125		25
21		52.8	63.4	74.1	84.7	95.4	106	117	127	138		39
22		57.9	69.5	81.2	92.8	104	116	128	139	151		29
23		63.2	75.9	88.6	101	114	127	139	152	165		23
24			82.5	96.3	110	124	138	152	165	179		30
25			89.4	104	119	134	149	164	179	194		27
26			96.6	113	129	145	161	177	194	210		35
27			104	121	139	156	174	191	209	226		28
28			112	130	149	168	187	205	224	243	261	33
29			120	140	160	180	200	220	240	260	280	20
30			128	149	171	192	214	235	257	278	299	23
31			137	159	182	205	228	251	274	297	319	23
32				170	194	218	243	267	291	316	340	30
33				180	206	232	258	284	310	335	361	20
34				191	219	246	274	301	328	356	383	21
35				203	232	261	290	319	348	377	406	15
36				214	245	276	306	337	368	398	429	22
37				226	259	291	323	356	388	420	453	18
38				238	273	307	341	375	409	443	477	21
39				251	287	323	359	395	431	467	502	12
40					302	339	377	415	453	490	528	8
41					317	356	396	436	475	515	555	9
42						374	415	457	499	540	582	3
43						392	435	479	522	566	609	6
44						410	455	501	547	592	638	1
45						429	476	524	571	619	667	2
46						448	497	547	597	647	696	2
47							519	571	623	675	727	1
Basis: No. trees	8	33	53	94	120	126	123	103	44	19	2	725

Block indicates extent of basic data.
Derived from: $V = 0.002302 \ D^2 H - 0.402357$.
Standard error of estimate: ± 11.44 percent.
Diameter classes full-inch; e. g. 20-inch class includes 20.0 to 20.9.

Table 2a.--Merchantable volumes in cubic feet to a 4.0-inch top, blackjack ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Merchantable stem excluding stump and top

Top diameter 4.0 inches inside bark
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet													Basis: Trees
	20	30	40	50	60	70	80	90	100	110	120	130	140	No.
	Volume in cubic feet													
5	0.87	1.40	1.94	2.47										10
6	1.29	2.04	2.79	3.53	4.28									20
7	1.79	2.78	3.78	4.77	5.77									11
8	2.35	3.63	4.91	6.19	7.47	8.75								12
9	2.99	4.59	6.18	7.78	9.38	11.0								19
10	3.70	5.65	7.60	9.55	11.5	13.8								14
11	4.48	6.82	9.16	11.5	14.3	17.0	19.7							22
12	5.33	8.09	10.9	14.0	17.2	20.4	23.6	26.9						34
13		9.47	12.9	16.7	20.4	24.2	27.9	31.7						33
14		11.0	15.2	19.6	23.9	28.2	32.5	36.8	41.2					32
15		12.8	17.7	22.6	27.6	32.5	37.5	42.4	47.3					33
16			20.3	25.9	31.5	37.1	42.7	48.3	53.9					32
17			23.1	29.4	35.7	42.0	48.3	54.6	60.9	67.2				41
18			26.1	33.1	40.2	47.2	54.2	61.3	68.3	75.3				36
19			29.2	37.0	44.8	52.7	60.5	68.3	76.1	83.9				30
20			32.5	41.1	49.8	58.4	67.1	75.7	84.3	93.0				34
21				45.5	55.0	64.5	74.0	83.5	93.0	102				26
22				50.0	60.4	70.8	81.2	91.6	102	112				37
23				54.7	66.1	77.4	88.8	100	111	123	134			26
24				59.6	72.0	84.3	96.7	109	121	134	146			32
25					78.2	91.5	105	118	132	145	158	172		24
26					84.6	99.0	113	128	142	157	171	186	200	30
27					91.2	107	122	138	153	169	185	200	216	23
28					98.1	115	132	148	165	182	198	215	232	27
29					105	123	141	159	177	195	213	231	248	19
30					113	132	151	170	189	208	227	247	266	25
31					120	141	161	182	202	222	243	263	284	18
32					128	150	172	193	215	237	259	280	302	18
33					136	159	183	206	229	252	275	298	321	15
34						169	194	218	243	267	292	316	341	21
35						179	205	231	257	283	309	335	361	15
36						190	217	244	272	299	327	354	381	22
37						200	229	258	287	316	345	374	403	9
38						211	242	272	303	333	364	394	425	4
39							255	287	319	351	383	415	447	4
40								301	335	369	403	436	470	3
41								317	352	387	423	458	494	2
42								332	369	406	444	481	518	0
43								348	387	426	465	504	543	1
Basis: No. trees	2	23	39	70	105	115	139	127	103	58	16	12	4	813

Block indicates extent of basic data.
Derived from: $V = 0.001770\ D^2H - 0.20550$ for D^2H to 6,500.
          $V = 0.002056\ D^2H - 2.061477$ for D^2H larger than 6,500.
Standard error of estimate: ± 14.81 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 2b. --Merchantable volumes in cubic feet to a 4.0-inch top, old-growth ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Merchantable stem excluding stump and top

Top diameter 4.0 inches inside bark
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet											Basis: Trees
	40	50	60	70	80	90	100	110	120	130	140	
	- - - - - - - - - - - Volume in cubic feet - - - - - - - - - - - - -											No.
12	12.7	16.2	19.7	23.2	26.7	30.3	33.8					21
13	15.0	19.1	23.2	27.3	31.4	35.5	39.7					25
14	17.5	22.3	27.0	31.7	36.5	41.2	46.0					18
15	20.2	25.6	31.1	36.5	41.9	47.3	52.7					26
16	23.1	29.3	35.4	41.5	47.7	53.8	60.0					28
17	26.2	33.1	40.0	46.9	53.8	60.7	67.6	74.5				30
18	29.4	37.1	44.9	52.6	60.3	68.0	75.7	83.5				24
19	32.9	41.4	50.0	58.6	67.2	75.7	84.3	92.9	101			27
20		45.9	55.4	64.9	74.4	83.8	93.3	103	112	122		25
21		50.7	61.1	71.5	81.9	92.4	103	113	124	134		39
22		55.6	67.1	78.5	89.9	101	113	124	136	147		29
23		60.8	73.3	85.7	98.2	111	123	136	148	160		23
24			79.8	93.3	107	120	134	147	161	175		30
25			86.5	101	116	131	145	160	175	189		27
26			93.6	109	125	141	157	173	189	204		35
27			101	118	135	152	169	186	203	220		28
28			108	127	145	163	182	200	218	237	255	33
29			116	136	156	175	195	214	234	254	273	20
30			124	145	166	187	208	229	250	271	292	23
31			133	155	178	200	222	245	267	289	312	23
32				165	189	213	237	261	284	308	332	30
33				176	201	226	252	277	302	328	353	20
34				186	213	240	267	294	321	347	374	21
35				197	226	254	283	311	340	368	396	15
36				209	239	269	299	329	359	389	419	22
37				221	252	284	316	347	379	411	443	18
38				233	266	299	333	366	400	433	467	21
39				245	280	315	350	386	421	456	491	12
40					294	331	368	405	442	479	516	8
41					309	348	387	426	465	503	542	9
42						365	406	447	487	528	569	3
43						383	425	468	511	553	596	6
44						400	445	490	534	579	624	1
45						419	465	512	559	605	652	2
46						437	486	535	584	632	681	2
47							507	558	609	660	711	1
Basis: No. trees	8	33	53	94	120	126	123	103	44	19	2	725

Block indicates extent of basic data.
Derived from: $V = 0.002255\ D^2 H - 1.440832$.
Standard error of estimate: ± 11.73 percent.
Diameter classes full-inch; e. g. 20-inch class includes 20.0 to 20.9.

Table 3a. --Merchantable volumes in cubic feet to a 4.0-inch top, blackjack ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Merchantable stem excluding stump and top

Top diameter 4.0 inches inside bark
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Number of merchantable 16-foot logs													Basis: Trees
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
	- - - - - - - - - - - - - Volume in cubic feet - - - - - - - - - - - - - - -													No.
12	14.0	17.6	21.2	24.8	28.4									32
13	15.2	19.4	23.6	27.8	32.0	36.1								33
14	16.5	21.3	26.1	31.0	35.8	40.7								32
15	17.9	23.4	28.9	34.4	40.0	45.4	50.7							33
16	19.3	25.6	31.8	38.1	44.4	50.4	56.4	62.4						32
17	20.9	27.9	35.0	42.0	48.9	55.6	62.4	69.2						41
18		30.4	38.3	46.1	53.7	61.2	68.8	76.3	83.9					36
19		33.0	41.8	50.3	58.7	67.1	75.5	83.9	92.3					30
20		35.8	45.4	54.7	64.0	73.3	82.6	91.9	101					34
21		38.7	49.1	59.3	69.6	79.8	90.0	100	110					26
22		41.7	53.0	64.2	75.4	86.6	97.8	109	120					37
23		44.9	57.1	69.3	81.5	93.7	106	118	130	143				26
24		48.1	61.3	74.6	87.9	101	114	128	141	154				32
25			65.8	80.1	94.5	109	123	138	152	166	181			24
26				85.9	101	117	132	148	163	179	195	210		30
27				91.8	109	125	142	159	175	192	209	226		23
28				98.0	116	134	152	170	188	206	224	242		27
29				104	124	143	162	181	201	220	239	258	278	19
30				111	132	152	173	193	214	234	255	276	296	24
31				118	140	162	184	206	228	250	271	293	315	18
32				125	148	172	195	218	242	265	288	312	335	18
33				132	157	182	207	232	256	281	306	331	356	15
34				140	166	192	219	245	271	298	324	350	377	21
35				148	175	203	231	259	287	315	343	370	398	15
36					185	214	244	273	303	332	362	391	421	22
37					195	226	257	288	319	350	381	412	443	9
38					205	238	270	303	336	369	401	434	467	4
39						250	284	319	353	388	422	457	491	4
40							298	335	371	407	443	480	516	3
41							313	351	389	427	465	503	541	2
42							328	368	407	447	487	527	567	0
43							343	385	426	468	510	552	594	1
Basis: No. trees	21	43	77	93	92	117	87	78	55	17	18	4	1	703

Block indicates extent of basic data.
Derived from: V = 0.0460 D²H + 6.80 for D²H to 800.
   V = 0.044204 D²H + 8.266000 for D²H larger than 800.
Standard error of estimate: ± 12.81 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 3b. --Merchantable volumes in cubic feet to a 4.0-inch top, old-growth ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Merchantable stem excluding stump and top

Top diameter 4.0 inches inside bark
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Number of merchantable 16-foot logs													Basis: Trees
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
	Volume in cubic feet													No.
12	13.8	17.7	21.7	25.7	29.6	33.6								21
13	15.1	19.7	24.3	29.0	33.6	38.2	42.8							25
14	16.5	21.8	27.2	32.5	37.8	43.2	48.5							18
15	18.0	24.1	30.2	36.3	42.4	48.5	54.6	60.3						26
16	19.7	26.6	33.5	40.4	47.2	54.1	60.7	66.9						28
17	21.4	29.1	36.9	44.7	52.4	59.9	66.9	73.9						30
18		31.9	40.5	49.2	57.8	65.6	73.5	81.3	89.1					24
19		34.8	44.4	54.0	63.0	71.7	80.4	89.1	97.8	107				27
20		37.8	48.5	58.9	68.5	78.1	87.7	97.3	107	117	126			25
21		41.0	52.7	63.7	74.3	84.9	95.4	106	117	127	138	148		39
22			57.2	68.7	80.3	91.9	103	115	127	138	150	161		29
23				74.0	86.6	99.3	112	125	137	150	162	175		23
24				79.5	93.2	107	121	134	148	162	176	189		30
25				85.2	100	115	130	145	160	174	189	204		27
26				91.2	107	123	139	155	171	188	204	220		35
27				97.3	115	132	149	167	184	201	218	236		28
28				104	122	141	159	178	197	216	234	252		33
29				110	130	150	170	190	210	230	250	270		20
30				117	138	160	181	202	224	245	266	287	309	23
31				124	147	170	192	215	238	260	283	306	329	23
32				132	156	180	204	228	252	277	301	325	349	30
33					165	191	216	242	267	293	319	344	370	20
34					174	201	229	256	283	310	337	365	392	21
35					184	213	241	270	299	328	357	386	414	15
36					194	224	255	285	316	346	376	407	437	22
37					204	236	268	300	332	365	397	429	461	18
38						248	282	316	350	384	418	452	485	21
39						261	296	332	368	403	439	475	510	12
40						273	311	348	386	423	461	498	536	8
41						287	326	365	405	444	483	523	562	9
42							341	383	424	465	507	548	589	3
43							357	400	444	487	530	573	617	6
44							373	418	464	509	554	600	645	1
45							390	437	484	532	579	626	674	2
46							406	456	505	555	604	654	703	2
47								475	527	578	630	682	733	1
Basis: No. trees	10	27	46	62	72	87	129	107	95	62	22	6	0	725

Block indicates extent of basic data.
Derived from: $V = 0.050666\ D^2H + 5.86680$ for D^2H to 1,000.
$V = 0.045736\ D^2H + 10.857212$ for D^2H larger than 1,000.
Standard error of estimate: $\pm$ 13.13 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 4a. --Merchantable volumes in cubic feet to the variable top limit of saw log utilization, blackjack ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet												Basis: Trees
	30	40	50	60	70	80	90	100	110	120	130	140	
	- - - - - - - - - - - - Volume in cubic feet - - - - - - - - - - - - - - -												No.
12	2.83	6.02	9.22	12.4	15.6	18.8	22.0						32
13	4.43	8.15	11.9	15.6	19.3	23.0	26.8						33
14	6.14	10.4	14.7	19.0	23.3	27.6	31.9	36.2					32
15	7.98	12.9	17.8	22.7	27.6	32.5	37.4	42.3					33
16		15.5	21.1	26.6	32.2	37.8	43.3	48.9					32
17		18.3	24.5	30.8	37.1	43.3	49.6	55.8	62.1				41
18		21.2	28.2	35.2	42.2	49.2	56.2	63.2	70.2				36
19		24.3	32.1	39.9	47.6	55.4	63.2	70.9	78.7				30
20			36.2	44.8	53.4	61.9	70.5	79.1	87.7				34
21			40.5	49.9	59.4	68.8	78.2	87.7	97.1				26
22			45.0	55.3	65.7	76.0	86.3	96.7	107				37
23			49.7	61.0	72.2	83.5	94.8	106	117	129			26
24			54.6	66.8	79.1	91.4	104	116	128	140			32
25				73.0	86.2	99.5	113	126	139	153	166		24
26				79.3	93.7	108	122	137	151	165	180	194	30
27				86.0	101	117	132	148	163	179	194	210	23
28				92.8	109	126	143	159	176	192	209	226	27
29				99.9	118	135	153	171	189	207	224	242	19
30				107	126	145	164	183	202	221	240	259	24
31				115	135	155	176	196	216	237	257	277	18
32				123	144	166	187	209	231	252	274	295	18
33				131	154	177	200	223	245	268	291	314	15
34					163	188	212	236	261	285	309	334	21
35					173	199	225	251	276	302	328	354	15
36					184	211	238	265	293	320	347	374	22
37					194	223	252	281	309	338	367	395	9
38					205	236	266	296	326	357	387	417	4
39						248	280	312	344	376	408	440	4
40							295	328	362	395	429	462	3
41							310	345	380	415	451	486	2
42							325	362	399	436	473	510	0
43							341	380	419	457	496	534	1
Basis: No. trees	1	7	38	88	110	139	127	103	58	16	12	4	703

Block indicates extent of basic data.
Derived from: $V = 0.002043\ D^2H - 6.744303$.
Standard error of estimate: ± 16.17 percent.
Diameter classes full-inch; e. g. 20-inch class includes 20.0 to 20.9.

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Table 4b. --Merchantable volumes in cubic feet to the variable top limit of saw log utilization,
old-growth ponderosa pines
Arizona and New Mexico

Cubic feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet												Basis: Trees
	40	50	60	70	80	90	100	110	120	130	140	No.
					Volume in cubic feet							
12	8.75	12.2	15.7	19.2	22.7	26.1	29.6					21
13	11.1	15.1	19.2	23.2	27.3	31.4	35.4					25
14	13.6	18.2	22.9	27.6	32.3	37.0	41.6					18
15	16.2	21.6	26.9	32.3	37.6	43.0	48.3					26
16	19.1	25.1	31.2	37.3	43.3	49.4	55.4					28
17	22.1	28.9	35.7	42.6	49.4	56.2	63.0	69.8				30
18	25.3	32.9	40.5	48.2	55.8	63.4	71.0	78.6				24
19	28.7	37.2	45.6	54.1	62.6	71.0	79.5	87.9	96.4			27
20		41.6	51.0	60.3	69.7	79.0	88.4	97.7	107	116		25
21		46.3	56.6	66.9	77.2	87.4	97.7	108	118	129		39
22		51.2	62.5	73.7	85.0	96.3	108	119	130	141		29
23		56.3	68.6	80.9	93.2	105	118	130	142	155		23
24			75.0	88.4	102	115	128	142	155	169		30
25			81.7	96.2	111	125	140	154	169	183		27
26			88.6	104	120	136	151	167	182	198		35
27			95.8	113	130	146	163	180	197	214		28
28			103	121	139	158	176	194	212	230	248	33
29			111	130	150	169	189	208	227	247	266	20
30			119	140	160	181	202	223	243	264	285	23
31			127	149	172	194	216	238	260	282	304	23
32				159	183	206	230	253	277	300	324	30
33				170	195	220	245	270	295	320	345	20
34				180	207	233	260	286	313	339	366	21
35				191	219	247	275	303	331	360	388	15
36				202	232	262	291	321	351	380	410	22
37				214	245	277	308	339	370	402	433	18
38				226	259	292	325	358	391	424	457	21
39				238	273	307	342	377	412	446	481	12
40					287	323	360	396	433	469	506	8
41					302	340	378	417	455	493	532	9
42						357	397	437	477	518	558	3
43						374	416	458	500	542	585	6
44					392	436	480	524	568	612		1
45					410	456	502	548	594	640		2
46					428	476	524	572	621	669		2
47						497	547	598	648	698		1
Basis: No. trees	8	33	53	94	120	126	123	103	44	19	2	725

Block indicates extent of basic data.
Derived from: $V = 0.002226 D^2 H - 5.161622$.
Standard error of estimate: ± 12.34 percent.
Diameter classes full-inch; e. g. 20-inch class includes 20.0 to 20.9.

Table 5a. --Volumes in board-feet Scribner rule, blackjack ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet												Basis: Trees
	30	40	50	60	70	80	90	100	110	120	130	140	
	- - - - - - - - - - - - Volume in board-feet - - - - - - - - - - - -												No.
12	18	33	48	62	77	92	107						32
13	25	43	60	77	94	112	129						33
14	33	53	73	93	113	133	153	177					32
15	42	65	87	110	133	156	186	219					33
16		77	103	128	154	188	226	263					32
17		90	119	148	183	226	268	311	353				41
18		103	136	171	218	266	313	361	408				36
19		118	154	202	255	308	361	413	466				30
20			177	236	294	352	411	469	527				34
21			206	271	335	399	463	527	592				26
22			237	307	378	448	518	588	659				37
23			269	346	422	499	576	652	729	806			26
24			302	386	469	552	636	719	802	886			32
25				427	518	608	698	788	879	969	1,059		24
26				471	568	666	763	861	958	1,056	1,153	1,251	30
27				516	621	726	831	936	1,041	1,146	1,251	1,356	23
28				562	675	788	901	1,013	1,126	1,239	1,352	1,465	27
29				611	731	852	973	1,094	1,215	1,336	1,456	1,577	19
30				661	790	919	1,048	1,177	1,306	1,436	1,565	1,694	24
31				712	850	988	1,126	1,263	1,401	1,539	1,677	1,815	18
32				765	912	1,059	1,206	1,352	1,499	1,646	1,792	1,939	18
33				820	976	1,132	1,288	1,444	1,600	1,756	1,911	2,067	15
34					1,042	1,208	1,373	1,538	1,704	1,869	2,034	2,199	21
35					1,110	1,285	1,461	1,636	1,811	1,986	2,161	2,336	15
36					1,180	1,365	1,550	1,735	1,921	2,106	2,291	2,476	22
37					1,252	1,448	1,643	1,838	2,034	2,229	2,424	2,619	9
38					1,326	1,532	1,738	1,944	2,150	2,355	2,561	2,767	4
39						1,619	1,835	2,052	2,269	2,485	2,702	2,919	4
40							1,935	2,163	2,391	2,619	2,847	3,074	3
41							2,038	2,277	2,516	2,755	2,995	3,234	2
42							2,143	2,394	2,645	2,895	3,146	3,397	0
43							2,250	2,513	2,776	3,039	3,302	3,564	1
Basis: No. trees	1	7	38	88	110	139	127	103	58	16	12	4	703

Block indicates extent of basic data.
Derived from: V = 0.009481 D²H - 26.48230 for D²H to 20,000.
             V = 0.013887 D²H - 114.596390 for D²H larger than 20,000.
Standard error of estimate: ± 22.79 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

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Table 5b.--Volumes in board-feet Scribner rule, old-growth ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	40	50	60	70	80	90	100	110	120	130	140	Basis: Trees No.
					- - Volume in board-feet - -							
12	31	49	68	87	105	124	143					21
13	43	65	87	108	130	152	174					25
14	56	82	107	132	157	182	207					18
15	71	100	128	157	186	215	247					26
16	86	119	151	184	216	254	297					28
17	102	139	176	212	254	302	350	398				30
18	120	161	202	246	299	353	406	460				24
19	138	183	229	287	347	406	466	526	585			27
20		207	265	331	397	463	529	595	660	726		25
21		232	305	377	450	522	594	667	739	812		39
22		267	346	425	505	584	663	743	822	901		29
23		303	389	476	562	649	735	822	909	995		23
24			435	529	623	717	811	905	999	1,093		30
25			482	583	685	787	889	991	1,093	1,195		27
26			530	640	750	860	970	1,080	1,191	1,301		35
27			581	700	818	937	1,055	1,174	1,292	1,410		28
28			634	761	888	1,016	1,143	1,270	1,397	1,525	1,652	33
29			688	825	961	1,097	1,234	1,370	1,506	1,643	1,779	20
30			745	890	1,036	1,182	1,328	1,473	1,619	1,765	1,911	23
31			803	958	1,114	1,269	1,425	1,580	1,736	1,891	2,047	23
32				1,029	1,194	1,360	1,525	1,691	1,856	2,021	2,187	30
33				1,101	1,277	1,453	1,628	1,804	1,980	2,156	2,332	20
34				1,176	1,362	1,549	1,735	1,921	2,108	2,294	2,481	21
35				1,252	1,450	1,647	1,845	2,042	2,239	2,437	2,634	15
36				1,331	1,540	1,749	1,957	2,166	2,375	2,584	2,792	22
37				1,412	1,633	1,853	2,073	2,294	2,514	2,734	2,955	18
38				1,496	1,728	1,960	2,192	2,425	2,657	2,889	3,121	21
39				1,581	1,826	2,070	2,315	2,559	2,803	3,048	3,292	12
40					1,926	2,183	2,440	2,697	2,954	3,211	3,468	8
41					2,029	2,299	2,568	2,838	3,108	3,378	3,648	9
42						2,417	2,700	2,983	3,266	3,549	3,832	3
43						2,538	2,835	3,131	3,428	3,724	4,020	6
44						2,662	2,973	3,283	3,593	3,903	4,213	1
45						2,789	3,114	3,438	3,762	4,087	4,411	2
46						2,919	3,258	3,596	3,935	4,274	4,613	2
47							3,405	3,758	4,112	4,465	4,819	1
Basis: No. trees	8	33	53	94	120	126	123	103	44	19	2	725

Block indicates extent of basic data.
Derived from: V = 0.011962 D²H - 44.1260 for D²H to 22,900.
              V = 0.015666 D²H - 129.672480 for D²H larger than 22,900.
Standard error of estimate: ± 16.17 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Derived from: $V = 0.011962\,D^2H - 44.1260$ for D^2H to 22,900.
$V = 0.015666\,D^2H - 129.672480$ for D^2H larger than 22,900.

Table 6a. --Volumes in board-feet Scribner Rule, blackjack ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Number of merchantable 16-foot logs													Basis: Trees
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	No.
	— — — — — — — — — — — Volume in board-feet — — — — — — — — — — —													
12	43	61	78	96	114									32
13	49	70	90	111	131	152								33
14	55	79	103	126	150	174								32
15	62	89	116	143	170	200	236							33
16	69	100	131	161	193	234	275	316						32
17	77	111	146	180	224	270	316	361						41
18		124	162	205	256	307	359	410	461					36
19		136	179	233	290	347	404	461	518					30
20		150	200	263	326	389	452	515	578					34
21		164	225	295	364	433	503	572	641					26
22		179	252	328	404	480	556	632	707					37
23		196	279	362	445	528	611	694	777	859				26
24		218	308	398	488	578	668	758	849	939				32
25			338	436	533	631	728	826	924	1,021	1,119			24
26				475	580	685	791	896	1,002	1,107	1,212	1,318		30
27				515	629	742	856	969	1,083	1,196	1,310	1,423		23
28				557	679	801	923	1,045	1,167	1,288	1,410	1,532		27
29				601	731	862	992	1,123	1,254	1,384	1,515	1,645	1,776	19
30				646	785	925	1,065	1,204	1,344	1,483	1,623	1,762	1,902	24
31				692	841	990	1,139	1,288	1,437	1,586	1,734	1,883	2,032	18
32				740	899	1,057	1,216	1,374	1,533	1,691	1,850	2,008	2,167	18
33				790	958	1,127	1,295	1,463	1,632	1,800	1,969	2,137	2,305	15
34				841	1,019	1,198	1,377	1,555	1,734	1,912	2,091	2,270	2,448	21
35				893	1,082	1,272	1,461	1,650	1,839	2,028	2,217	2,406	2,595	15
36					1,147	1,347	1,547	1,747	1,947	2,147	2,347	2,546	2,746	22
37					1,214	1,425	1,636	1,847	2,058	2,269	2,480	2,691	2,902	9
38					1,282	1,505	1,727	1,949	2,172	2,394	2,617	2,839	3,061	4
39						1,587	1,821	2,055	2,289	2,523	2,757	2,991	3,225	4
40							1,917	2,163	2,409	2,655	2,901	3,147	3,393	3
41							2,015	2,274	2,532	2,790	3,049	3,307	3,566	2
42							2,116	2,387	2,658	2,929	3,200	3,471	3,742	0
43							2,219	2,503	2,787	3,071	3,355	3,639	3,923	1
Basis: No. trees	21	43	77	93	92	117	87	78	55	17	18	4	1	703

Block indicates extent of basic data.
Derived from: $V = 0.224793\ D^2H + 8.16560$ for D^2H to 800.
                 $V = 0.300081\ D^2H - 52.090112$ for D^2H larger than 800.
Standard error of estimate: $\pm$ 16.46 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 6b. --Volumes in board-feet Scribner Rule, old-growth ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	___	___	___	___	Number of merchantable 16-foot logs									Basis: Trees
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	No.
12	38	60	81	103	124	146								21
13	45	70	95	121	146	171	196							25
14	53	82	111	140	169	198	227							18
15	61	94	127	161	194	227	260	292						26
16	70	108	145	183	220	258	294	337						28
17	79	122	164	206	248	290	337	387						30
18		136	184	231	278	328	384	440	496					24
19		152	205	257	309	371	434	496	558	620				27
20		169	227	285	349	417	486	554	623	692	760			25
21		186	250	314	390	465	541	616	691	767	842	918		39
22			274	350	433	515	598	681	763	846	929	1,011		29
23				388	478	568	658	748	838	929	1,019	1,109		23
24				427	525	623	721	819	917	1,015	1,113	1,211		30
25				468	574	680	786	892	998	1,104	1,211	1,317		27
26				510	625	739	854	969	1,083	1,198	1,312	1,427		35
27				554	678	801	924	1,048	1,171	1,295	1,418	1,542		28
28				600	732	865	998	1,130	1,263	1,395	1,528	1,660		33
29				647	789	931	1,073	1,215	1,357	1,499	1,641	1,784		20
30				696	848	1,000	1,152	1,304	1,455	1,607	1,759	1,911	2,063	23
31				747	909	1,071	1,233	1,395	1,557	1,718	1,880	2,042	2,204	23
32				799	971	1,144	1,316	1,489	1,661	1,833	2,006	2,178	2,351	30
33					1,036	1,219	1,402	1,586	1,769	1,952	2,135	2,318	2,501	20
34					1,103	1,297	1,491	1,685	1,880	2,074	2,268	2,462	2,657	21
35					1,171	1,377	1,583	1,788	1,994	2,200	2,405	2,611	2,817	15
36					1,242	1,459	1,677	1,894	2,111	2,329	2,546	2,764	2,981	22
37					1,314	1,544	1,773	2,003	2,232	2,462	2,691	2,921	3,150	18
38						1,631	1,872	2,114	2,356	2,598	2,840	3,082	3,324	21
39						1,720	1,974	2,229	2,484	2,738	2,993	3,248	3,502	12
40						1,811	2,079	2,346	2,614	2,882	3,150	3,417	3,685	8
41						1,905	2,186	2,467	2,748	3,029	3,310	3,591	3,872	9
42							2,295	2,590	2,885	3,180	3,475	3,769	4,064	3
43							2,408	2,717	3,025	3,334	3,643	3,952	4,261	6
44							2,523	2,846	3,169	3,492	3,815	4,139	4,462	1
45							2,640	2,978	3,316	3,654	3,992	4,330	4,668	2
46							2,760	3,113	3,466	3,819	4,172	4,525	4,878	2
47								3,251	3,620	3,988	4,356	4,724	5,093	1
Basis: No. trees	10	27	46	62	72	87	129	107	95	62	22	6	0	725

Block indicates extent of basic data.
Derived from: $V = 0.275784\ D^2H - 5.091250$ for D^2H to 1,130.
$\qquad\qquad\quad V = 0.326427\ D^2H - 62.962331$ for D^2H larger than 1,130.
Standard error of estimate: $\pm\ 12.98$ percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 7a. --Volumes in board-feet International 1/4-inch Rule, blackjack ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet												Basis: Trees
	30	40	50	60	70	80	90	100	110	120	130	140	No.
	- - - - - - - - - - - - - Volume in board-feet - - - - - - - - - - - - -												
12	18	36	54	73	91	109	128						32
13	27	48	70	91	112	134	155						33
14	37	61	86	111	135	160	185	212					32
15	47	75	104	132	160	188	221	255					33
16		90	122	154	186	223	262	301					32
17		106	142	178	218	262	305	349	393				41
18		123	163	205	254	303	352	400	449				36
19		141	186	238	292	346	400	455	509				30
20			212	272	332	392	452	512	572				34
21			242	308	374	440	506	572	638				26
22			273	345	418	490	562	634	707				37
23			306	385	464	542	621	700	779	858			26
24			340	426	512	597	683	769	854	940			32
25				469	562	654	747	840	933	1,025	1,118		24
26				513	613	714	814	914	1,014	1,115	1,215	1,315	30
27				560	667	775	883	991	1,099	1,207	1,315	1,423	23
28				607	723	839	955	1,071	1,187	1,303	1,419	1,535	27
29				657	781	905	1,030	1,154	1,278	1,402	1,526	1,651	19
30				708	841	974	1,107	1,239	1,372	1,505	1,638	1,770	24
31				762	903	1,045	1,186	1,328	1,470	1,611	1,753	1,894	18
32				816	967	1,118	1,269	1,419	1,570	1,721	1,871	2,022	18
33				873	1,033	1,193	1,353	1,513	1,674	1,834	1,994	2,154	15
34					1,101	1,271	1,441	1,610	1,780	1,950	2,120	2,290	21
35					1,171	1,351	1,531	1,710	1,890	2,070	2,250	2,430	15
36					1,243	1,433	1,623	1,813	2,003	2,193	2,383	2,574	22
37					1,317	1,517	1,718	1,919	2,119	2,320	2,521	2,721	9
38					1,393	1,604	1,816	2,027	2,239	2,450	2,662	2,873	4
39						1,693	1,916	2,138	2,361	2,584	2,806	3,029	4
40							2,019	2,253	2,487	2,721	2,955	3,189	3
41							2,124	2,370	2,615	2,861	3,107	3,353	2
42							2,232	2,490	2,747	3,005	3,263	3,521	0
43							2,342	2,612	2,882	3,152	3,422	3,692	1
Basis: No. trees	1	7	38	88	110	139	127	103	58	16	12	4	703

Block indicates extent of basic data.
Derived from: V = 0.011744 D^2H - 37.47260 for D^2H to 20,000.
                V = 0.014270 D^2H - 87.992784 for D^2H larger than 20,000.
Standard error of estimate: ± 21.52 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

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Table 7b. --Volumes in board-feet International 1/4-inch rule, old-growth ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Total height in feet											Basis: Trees
	40	50	60	70	80	90	100	110	120	130	140	
	Volume in board-feet											No.
12	40	61	83	105	127	149	171					21
13	54	80	105	131	156	182	207					25
14	70	99	129	158	187	217	246					18
15	87	120	154	187	221	255	290					26
16	104	143	181	219	257	298	342					28
17	124	166	209	252	298	347	396	445				30
18	144	192	239	289	344	399	454	509				24
19	165	218	271	332	393	454	515	576	637			27
20		246	309	377	444	512	579	647	714	781		25
21		276	350	424	498	572	646	721	795	869		39
22		311	392	473	555	636	717	798	879	961		29
23		348	437	525	614	702	791	879	968	1,057		23
24			483	579	675	772	868	964	1,060	1,157		30
25			531	635	739	844	948	1,052	1,157	1,261		27
26			581	694	806	919	1,031	1,144	1,257	1,369		35
27			633	754	875	997	1,118	1,239	1,361	1,482		28
28			687	817	947	1,078	1,208	1,338	1,469	1,599	1,729	33
29			743	882	1,022	1,161	1,301	1,441	1,580	1,720	1,859	20
30			800	950	1,099	1,248	1,397	1,546	1,696	1,845	1,994	23
31			860	1,019	1,178	1,337	1,497	1,656	1,815	1,974	2,133	23
32				1,091	1,260	1,430	1,599	1,769	1,938	2,108	2,277	30
33				1,165	1,345	1,525	1,705	1,885	2,065	2,245	2,425	20
34				1,241	1,432	1,623	1,814	2,005	2,196	2,387	2,578	21
35				1,320	1,522	1,724	1,927	2,129	2,331	2,533	2,735	15
36				1,401	1,615	1,828	2,042	2,256	2,469	2,683	2,897	22
37				1,484	1,710	1,935	2,161	2,386	2,612	2,837	3,063	18
38				1,569	1,807	2,045	2,283	2,520	2,758	2,996	3,234	21
39				1,657	1,907	2,158	2,408	2,658	2,908	3,159	3,409	12
40					2,010	2,273	2,536	2,799	3,062	3,325	3,589	8
41					2,115	2,391	2,668	2,944	3,220	3,496	3,773	9
42						2,513	2,802	3,092	3,382	3,672	3,961	3
43						2,637	2,940	3,244	3,547	3,851	4,154	6
44						2,764	3,082	3,399	3,717	4,034	4,352	1
45						2,894	3,226	3,558	3,890	4,222	4,554	2
46						3,027	3,373	3,720	4,067	4,414	4,761	2
47							3,524	3,886	4,248	4,610	4,972	1
Basis: No. trees	8	33	53	94	120	126	123	103	44	19	2	725

Block indicates extent of basic data.
Derived from: V = 0.0140 D²H - 48.0 for D²H to 21,800.
               V = 0.016041 D²H - 95.013379 for D²H larger than 21,800.
Standard error of estimate: ± 15.70 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 8a. --Volumes in board-feet International 1/4-inch Rule, blackjack ponderosa pines
Arizona and New Mexico

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 foot

Diameter breast height outside bark (Inches)	Number of merchantable 16-foot logs													Basis: Trees
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
	Volume in board-feet													No.
12	53	73	94	114	134									32
13	60	84	107	131	155	179								33
14	67	94	122	149	177	203								32
15	75	106	138	169	198	235	273							33
16	83	119	154	190	228	270	312	354						32
17	92	132	172	212	259	307	354	401						41
18		146	191	240	293	346	398	451	504					36
19		161	211	269	328	387	445	504	562					30
20		177	235	300	365	430	495	559	624					34
21		193	261	333	404	475	546	618	689					26
22		210	288	366	445	523	601	679	757					37
23		232	317	402	487	572	657	743	828	913				26
24		254	346	439	531	624	717	809	902	994				32
25			377	477	578	678	778	879	979	1,079	1,179			24
26				518	626	734	842	951	1,059	1,167	1,276	1,384		30
27				559	676	792	909	1,026	1,142	1,259	1,376	1,492		23
28				602	728	853	978	1,103	1,229	1,354	1,479	1,604		27
29				647	781	915	1,050	1,184	1,318	1,452	1,586	1,721	1,855	19
30				693	837	980	1,124	1,267	1,411	1,554	1,697	1,841	1,984	24
31				741	894	1,047	1,200	1,353	1,506	1,659	1,812	1,965	2,118	18
32				791	953	1,116	1,279	1,442	1,605	1,768	1,931	2,094	2,256	18
33				841	1,014	1,188	1,361	1,534	1,707	1,880	2,053	2,226	2,399	15
34				894	1,077	1,261	1,444	1,628	1,812	1,995	2,179	2,362	2,546	21
35				948	1,142	1,336	1,531	1,725	1,919	2,114	2,308	2,502	2,697	15
36				1,209	1,414	1,620	1,825	2,030	2,236	2,441	2,647	2,852		22
37				1,277	1,494	1,711	1,928	2,145	2,361	2,578	2,795	3,012		9
38				1,348	1,576	1,805	2,033	2,262	2,490	2,719	2,948	3,176		4
39					1,660	1,901	2,141	2,382	2,623	2,863	3,104	3,344		4
40						2,000	2,253	2,505	2,758	3,011	3,264	3,517		3
41						2,101	2,366	2,632	2,897	3,163	3,429	3,694		2
42						2,204	2,483	2,761	3,040	3,318	3,597	3,876		0
43						2,310	2,602	2,894	3,186	3,478	3,769	4,061		1
Basis: No. trees	21	43	77	93	92	117	87	78	55	17	18	4	1	703

Block indicates extent of basic data.
Derived from: $V = 0.260550\ D^2H + 12.312250$ for D^2H to 700.
$V = 0.308405\ D^2H - 23.872559$ for D^2H larger than 700.
Standard error of estimate: ± 15.26 percent.
Diameter classes full-inch; e.g. 20-inch calss includes 20.0 to 20.9.

Board-feet inside bark
Merchantable stem excluding stump and top

Top diameter variable
Stump height 1.0 feet

Diameter breast height outside bark (Inches)	Number of merchantable 16-foot logs													Basis: Trees
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
	Volume in board-feet													No.
12	48	73	98	123	148	173								21
13	56	86	115	144	173	203	232							25
14	65	99	133	166	200	234	268							18
15	75	113	152	191	229	268	306	345						26
16	85	129	173	216	260	304	347	391						28
17	96	145	194	243	293	342	391	435						30
18		163	217	272	327	382	432	485	542					24
19		181	242	303	364	419	478	542	606	669				27
20		200	268	335	402	462	532	602	672	743	813			25
21		220	294	369	438	511	588	665	743	820	897	974		39
22			323	404	478	562	647	732	816	901	985	1,070		29
23				438	524	616	708	801	893	985	1,078	1,170		23
24				472	572	672	773	873	973	1,074	1,174	1,274		30
25				513	622	731	839	948	1,057	1,166	1,274	1,383		27
26				557	674	792	909	1,026	1,144	1,261	1,379	1,496		35
27				602	728	855	981	1,108	1,234	1,361	1,487	1,613		28
28				649	785	920	1,056	1,192	1,328	1,463	1,599	1,735		33
29				697	843	988	1,134	1,279	1,425	1,570	1,716	1,861		20
30				747	903	1,058	1,214	1,369	1,525	1,680	1,836	1,991	2,147	23
31				799	965	1,131	1,297	1,463	1,629	1,794	1,960	2,126	2,292	23
32				853	1,029	1,206	1,382	1,559	1,736	1,912	2,089	2,265	2,442	30
33					1,096	1,283	1,471	1,658	1,846	2,034	2,221	2,409	2,596	20
34					1,164	1,363	1,562	1,761	1,960	2,159	2,358	2,557	2,755	21
35					1,234	1,445	1,655	1,866	2,077	2,287	2,498	2,709	2,919	15
36					1,306	1,529	1,752	1,974	2,197	2,420	2,642	2,865	3,088	22
37					1,380	1,615	1,851	2,086	2,321	2,556	2,791	3,026	3,261	18
38						1,704	1,952	2,200	2,448	2,696	2,943	3,191	3,439	21
39						1,796	2,056	2,317	2,578	2,839	3,100	3,361	3,621	12
40						1,889	2,163	2,438	2,712	2,986	3,260	3,534	3,809	8
41						1,985	2,273	2,561	2,849	3,137	3,425	3,713	4,001	9
42							2,385	2,687	2,989	3,291	3,593	3,895	4,197	3
43							2,500	2,817	3,133	3,449	3,766	4,082	4,398	6
44							2,618	2,949	3,280	3,611	3,942	4,273	4,604	1
45							2,739	3,085	3,431	3,777	4,123	4,469	4,815	2
46							2,862	3,223	3,584	3,946	4,307	4,669	5,030	2
47								3,364	3,742	4,119	4,496	4,873	5,250	1
Basis: No. trees	10	27	46	62	72	87	129	107	95	62	22	6	0	725

Block indicates extent of basic data.
Derived from: V = 0.320812 D^{2}H - 2.126875 for D^{2}H to 1,386.
    V = 0.334337 D^{2}H - 30.126317 for D^{2}H larger than 1,386.
Standard error of estimate: ± 12.46 percent.
Diameter classes full-inch; e.g. 20-inch class includes 20.0 to 20.9.

Table 9a. --Scaling diameters of 16.5-foot logs of the average tree in each merchantable height and diameter class, blackjack ponderosa pine

Merchantable height logs	Diameter breast height (Inches)	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
		Diameter inside bark in inches										
1.0	12.5	9										
	13.5	9										
	14.5	10										
	15.5	10										
1.5	12.5	9	8									
	13.5	10	9									
	14.5	10	9									
	15.5	11	9									
	16.5	11	10									
	17.5	12	10									
2.0	12.5	9		8								
	13.5	10		8								
	14.5	11		9								
	15.5	11		9								
	16.5	12		9								
	17.5	13		10								
	18.5	13		10								
	19.5	14		11								
	20.5	15		11								
	21.5	15		12								
	22.5	16		12								
	23.5	17		12								
	24.5	17		13								
2.5	12.5	10		8	8							
	13.5	11		9	8							
	14.5	11		9	8							
	15.5	12		10	8							
	16.5	13		10	9							
	17.5	13		11	9							
	18.5	14		11	10							
	19.5	15		12	10							
	20.5	15		12	0							
	21.5	16		13	11							
	22.5	17		13	11							
	23.5	17		14	12							
	24.5	18		14	12							
3.0	13.5	11		9		8						
	14.5	12		10		8						
	15.5	13		10		8						
	16.5	13		11		8						
	17.5	14		12		9						
	18.5	15		12		9						
	19.5	15		13		9						
	20.5	16		13		9						
	21.5	17		14		10						
	22.5	17		14		10						
	23.5	18		15		11						
	24.5	19		15		11						
	25.5	19		16		11						
	26.5	20		17		12						
	27.5	21		17		12						
	28.5	22		18		13						
	29.5	22		18		13						
	30.5	23		19		14						
	31.5	24		19		14						
	32.5	24		20		14						
	33.5	25		21		15						
	34.5	26		21		15						
	35.5	26		22		16						
3.5	15.5	13		11		9	8					
	16.5	14		12		9	8					
	17.5	15		12		10	9					
	18.5	15		13		10	9					
	19.5	16		13		10	9					
	20.5	17		14		11	9					
	21.5	17		15		11	9					
	22.5	18		15		12	10					
	23.5	19		16		12	10					
	24.5	19		17		13	10					
	25.5	20		17		13	11					
	26.5	21		18		13	11					
	27.5	21		18		14	12					
	28.5	22		19		14	12					
	29.5	23		20		15	12					
	30.5	23		20		15	13					
	31.5	24		21		15	13					
	32.5	25		21		16	13					
	33.5	26		22		16	14					
	34.5	26		23		17	14					
	35.5	27		23		17	15					
	36.5	28		24		18	15					
	37.5	28		25		18	15					
	38.5	29		25		18	16					
4.0	16.5	14		12		10		9				
	17.5	15		13		11		9				
	18.5	16		14		11		9				
	19.5	16		14		12		9				
	20.5	17		15		12		9				
	21.5	18		16		13		9				
	22.5	19		16		13		9				
	23.5	19		17		14		9				
	24.5	20		17		14		10				
	25.5	21		18		15		10				
	26.5	21		19		15		10				
	27.5	22		19		15		11				
	28.5	23		20		16		11				
	29.5	23		21		16		11				
	30.5	24		21		17		12				
	31.5	25		22		17		12				
	32.5	26		22		18		12				
	33.5	26		23		18		13				
	34.5	27		24		19		13				
	35.5	27		24		19		13				
	36.5	28		25		20		14				
	37.5	29		26		20		14				
	38.5	30		26		21		15				
4.5	18.5	16		15		12		10	9			
	19.5	17		15		13		10	9			
	20.5	18		16		13		10	9			
	21.5	18		16		14		11	9			
	22.5	19		17		14		11	9			
	23.5	20		18		15		12	10			
	24.5	20		18		15		12	10			
	25.5	21		19		16		12	10			
	26.5	22		20		16		13	10			
	27.5	22		20		17		13	11			
	28.5	23		21		18		13	11			
	29.5	24		21		18		14	11			
	30.5	25		22		19		14	11			
	31.5	25		23		19		14	12			
	32.5	26		23		20		15	12			
	33.5	27		24		20		15	12			
	34.5	27		25		21		16	12			
	35.5	28		25		21		16	13			
	36.5	29		26		22		16	13			
	37.5	29		26		22		17	13			
	38.5	30		27		23		17	13			
5.0	23.5	20		18		17		14		10		
	24.5	21		19		17		14		10		
	25.5	21		20		18		14		10		
	26.5	22		20		18		15		10		
	27.5	23		21		19		15		10		
	28.5	24		22		19		16		11		
	29.5	24		22		20		16		11		
	30.5	25		23		20		16		11		
	31.5	26		24		21		17		11		
	32.5	27		25		21		17		11		
	33.5	27		25		22		18		12		
	34.5	28		26		22		18		12		
	35.5	29		27		23		18		12		
	36.5	30		27		23		19		12		
	37.5	30		28		24		19		13		
	38.5	31		29		24		20		13		
5.5	26.5	22		21		19		17		12	10	
	27.5	23		22		20		17		13	10	
	28.5	24		22		21		18		13	10	
	29.5	25		23		21		18		13	11	
	30.5	26		24		22		19		14	11	
	31.5	26		25		22		19		14	11	
	32.5	27		25		23		20		15	12	
	33.5	28		26		23		20		15	12	
	34.5	29		27		24		21		15	12	
	35.5	30		28		25		21		16	13	
	36.5	30		28		25		22		16	13	
	37.5	31		29		26		22		16	14	
	38.5	32		30		27		22		17	14	
6.0	26.5	23		22		21		19		14		
	27.5	23		22		21		19		15		
	28.5	24		23		22		20		15		
	29.5	25		24		22		20		16		
	30.5	26		25		23		21		16		
	31.5	27		25		24		21		17		
	32.5	28		26		24		22		17		
	33.5	28		27		25		22		17		
	34.5	29		28		26		23		18		
	35.5	30		28		26		23		18		
	36.5	31		29		27		24		19		
	37.5	32		30		27		24		19		
	38.5	33		31		28		25		20		

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old-growth ponderosa pine

Left section

Merchantable height logs	Diameter breast height (Inches)	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
1.0	12.5	9										
	13.5	9										
	14.5	10										
	15.5	11										
	16.5	11										
1.5	12.5	9	8									
	13.5	10	9									
	14.5	11	9									
	15.5	11	10									
	16.5	12	11									
	17.5	13	11									
2.0	12.5	10		8								
	13.5	10		8								
	14.5	11		9								
	15.5	12		9								
	16.5	13		9								
	17.5	13		10								
	18.5	14		10								
	19.5	15		11								
	20.5	16		11								
	21.5	16		12								
2.5	12.5	10		8	8							
	13.5	11		9	8							
	14.5	12		9	9							
	15.5	12		10	9							
	16.5	13		11	9							
	17.5	14		11	9							
	18.5	15		12	10							
	19.5	15		12	11							
	20.5	16		13	11							
	21.5	17		13	12							
	22.5	18		14	12							
3.0	12.5	10		9		8						
	13.5	11		10		8						
	14.5	12		10		8						
	15.5	13		11		8						
	16.5	13		11		9						
	17.5	14		12		9						
	18.5	15		13		9						
	19.5	16		13		9						
	20.5	17		14		10						
	21.5	17		14		10						
	22.5	18		15		10						
	23.5	19		16		10						
	24.5	20		16		11						
	25.5	21		17		11						
	26.5	21		18		11						
	27.5	22		18		11						
	28.5	23		19		12						
3.5	13.5	12		10		9	8					
	14.5	12		11		9	8					
	15.5	13		12		10	8					
	16.5	14		12		10	9					
	17.5	15		13		10	9					
	18.5	15		13		11	9					
	19.5	16		14		11	9					
	20.5	17		15		11	9					
	21.5	18		15		12	10					
	22.5	18		16		12	10					
	23.5	19		17		13	10					
	24.5	20		17		13	11					
	25.5	21		18		13	11					
	26.5	22		19		14	11					
	27.5	23		19		15	12					
	28.5	23		20		15	12					
	29.5	24		21		16	12					
	30.5	25		22		16	12					
	31.5	26		22		17	13					
	32.5	27		23		18	13					
	33.5	27		24		18	13					
	34.5	28		25		19	14					
	35.5	29		25		19	14					
	36.5	30		26		20	14					
	37.5	31		27		21	15					
4.0	15.5	13		12		11		8				
	16.5	14		13		11		9				
	17.5	15		13		12		9				
	18.5	16		14		12		9				
	19.5	16		15		12		9				
	20.5	17		15		13		9				
	21.5	18		16		13		9				
	22.5	19		17		14		10				
	23.5	20		17		14		10				
	24.5	20		18		15		10				
	25.5	21		19		15		11				
	26.5	22		19		16		11				
	27.5	23		20		16		11				
	28.5	24		21		17		11				
	29.5	24		22		18		12				
	30.5	25		22		18		12				
	31.5	26		23		19		12				
	32.5	27		24		19		13				

Right section

Merchantable height logs	Diameter breast height (Inches)	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
4.0 (continued)	33.5	28		25		20		13				
	34.5	29		25		21		13				
	35.5	29		26		21		13				
	36.5	30		27		22		14				
	37.5	31		28		23		14				
	38.5	32		29		23		14				
	39.5	33		29		24		14				
	40.5	33		30		25		15				
	41.5	34		31		25		15				
4.5	18.5	16		14		13		11	9			
	19.5	17		15		13		11	9			
	20.5	17		16		14		11	9			
	21.5	18		16		14		12	9			
	22.5	19		17		15		12	10			
	23.5	20		18		15		12	10			
	24.5	20		19		16		13	10			
	25.5	21		19		17		13	10			
	26.5	22		20		17		13	11			
	27.5	23		21		18		14	11			
	28.5	24		22		18		14	11			
	29.5	25		22		19		14	11			
	30.5	26		23		20		15	12			
	31.5	26		24		20		15	12			
	32.5	27		25		21		15	12			
	33.5	28		25		21		16	12			
	34.5	29		26		22		16	13			
	35.5	30		27		23		17	13			
	36.5	31		28		23		17	13			
	37.5	32		28		24		17	13			
	38.5	33		29		25		18	14			
	39.5	34		30		25		18	14			
	40.5	34		31		26		18	14			
	41.5	35		32		27		19	14			
5.0	19.5	17		16		14		12		9		
	20.5	18		16		15		12		10		
	21.5	18		17		15		13		10		
	22.5	19		18		16		13		10		
	23.5	20		18		16		14		10		
	24.5	21		19		17		14		10		
	25.5	21		20		18		15		10		
	26.5	22		21		18		15		10		
	27.5	23		21		19		15		11		
	28.5	24		22		19		16		11		
	29.5	25		23		20		16		11		
	30.5	26		24		21		17		11		
	31.5	27		24		21		17		12		
	32.5	28		25		22		18		12		
	33.5	28		26		23		18		12		
	34.5	29		27		23		19		13		
	35.5	30		27		24		19		13		
	36.5	31		28		24		20		13		
	37.5	32		29		25		20		13		
	38.5	33		30		26		21		14		
	39.5	34		31		26		21		14		
	40.5	35		31		27		22		14		
	41.5	36		32		28		22		14		
5.5	20.5	18		17		15		13		11	9	
	21.5	18		18		16		14		11	10	
	22.5	19		18		17		14		12	10	
	23.5	20		19		17		15		12	10	
	24.5	21		20		18		15		12	10	
	25.5	22		21		18		16		13	10	
	26.5	23		21		19		16		13	10	
	27.5	23		22		20		17		13	10	
	28.5	24		23		20		17		13	11	
	29.5	25		24		21		18		14	11	
	30.5	26		24		22		18		14	11	
	31.5	27		25		22		19		14	11	
	32.5	28		26		23		19		15	12	
	33.5	29		26		24		20		15	12	
	34.5	30		27		24		20		16	12	
	35.5	30		28		25		21		16	13	
	36.5	31		29		26		22		16	13	
	37.5	32		29		26		22		17	13	
	38.5	33		30		27		23		17	13	
	39.5	34		31		28		23		17	14	
	40.5	36		32		28		24		18	14	
	41.5	37		33		29		25		18	14	
6.0	27.5	23		22		21		18		15		10
	28.5	24		23		21		19		15		10
	29.5	25		24		22		19		15		11
	30.5	26		25		23		20		16		11
	31.5	27		25		23		20		16		11
	32.5	28		26		24		21		17		11
	33.5	29		27		25		22		17		12
	34.5	30		28		25		22		18		12
	35.5	31		28		26		23		18		12
	36.5	32		29		27		24		18		12
	37.5	33		30		27		24		19		13
	38.5	34		31		28		25		19		13
	39.5	35		32		29		26		20		13
	40.5	36		32		29		26		20		13
	41.5	37		33		30		27		20		14

Table 10. --Percentage of total board-foot volume in each log of a tree, ponderosa pine

D.b.h. (inches) and tree height (logs)	Position of log in the tree											
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
	- - - - - - - - - - - - - Percent of total tree volume - - - - - - - - - - - - - -											
Trees 12 inches d.b.h.:												
1.0	100	--										
1.5	73	27										
2.0	59	--	41									
2.5	50	--	36	14								
3.0	41	--	34	--	25							
3.5	33	--	31	--	23	13						
'rees 20 inches d.b.h.:												
1.5	78	22										
2.0	68	--	32									
2.5	58	--	32	10								
3.0	49	--	33	--	18							
3.5	41	--	33	--	19	7						
4.0	37	--	32	--	20	--	11					
4.5	32	--	30	--	21	--	13	4				
5.0	28	--	27	--	22	--	15	--	8			
5.5	25	--	25	--	22	--	16	--	10	2		
6.0	24	--	22	--	22	--	17	--	12	--	3	
Trees 30 inches d.b.h.:												
2.5	65	--	28	7								
3.0	57	--	32	--	11							
3.5	49	--	32	--	15	4						
4.0	44	--	31	--	17	--	8					
4.5	39	--	29	--	19	--	10	3				
5.0	34	--	28	--	21	--	13	--	4			
5.5	30	--	26	--	21	--	14	--	7	2		
6.0	26	--	25	--	22	--	15	--	9	--	3	
6.5	24	--	23	--	22	--	15	--	11	--	4	1
Trees 40 inches d.b.h.:												
4.0	51	--	30	--	13	--	6					
4.5	46	--	28	--	16	--	8	2				
5.0	42	--	27	--	18	--	10	--	3			
5.5	37	--	27	--	19	--	11	--	5	1		
6.0	33	--	26	--	20	--	12	--	7	--	2	
6.5	30	--	24	--	20	--	12	--	9	--	4	1

Table 11. --Volumes of top wood between the upper limit of saw-log utilization and 4.0 inches d.i.b. as percentages of merchantable cubic-foot volume to 4.0-inch top, southwestern ponderosa pine

Diameter breast height class[1] (inches)	Age class		Diameter breast height class (inches)	Age class	
	Blackjacks	Old growth		Blackjacks	Old growth
	Percent			Percent	
12.0	35.5	28.3	28.0	4.0	3.3
14.0	21.8	19.1	30.0	3.7	3.1
16.0	14.2	13.3	32.0	3.2	2.9
18.0	9.4	8.9	34.0	2.8	2.7
20.0	7.2	6.2	36.0	2.4	2.5
22.0	5.9	5.1	38.0	2.0	2.3
24.0	5.0	4.2	40.0	1.6	2.1
26.0	4.5	3.7	42.0	1.2	2.0

[1] Full-inch diameter classes by 2-inch intervals, e.g., 20.0-inch class includes 19.0 to 20.9.

Myers, Clifford A.
1963 (rev. 1972).
    Volume, taper, and related tables for Southwestern
    ponderosa pine. U. S. Forest Serv. Res. Pap. RM-2,
    24 p. Rocky Mt. Forest and Range Exp. Stn., Fort
    Collins, Colo. 80521.

Presents volume tables, taper tables, and the distribu-
tion of tree volumes among the logs of saw log trees.
Volumes are in total cubic feet and cubic feet to a
variable top. Tree heights are in feet and numbers of
logs.

Keywords: *Pinus ponderosa*, forest measurement, tree
    volume tables.

Myers, Clifford A.
1963 (rev. 1972).
    Volume, taper, and related tables for Southwestern
    ponderosa pine. U. S. Forest Serv. Res. Pap. RM-2,
    24 p. Rocky Mt. Forest and Range Exp. Stn., Fort
    Collins, Colo. 80521.

Presents volume tables, taper tables, and the distribu-
tion of tree volumes among the logs of saw log trees.
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variable top. Tree heights are in feet and numbers of
logs.

Keywords: *Pinus ponderosa*, forest measurement, tree
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    24 p. Rocky Mt. Forest and Range Exp. Stn., Fort
    Collins, Colo. 80521.

Presents volume tables, taper tables, and the distribu-
tion of tree volumes among the logs of saw log trees.
Volumes are in total cubic feet and cubic feet to a
variable top. Tree heights are in feet and numbers of
logs.

Keywords: *Pinus ponderosa*, forest measurement, tree
    volume tables.

Myers, Clifford A.
1963 (rev. 1972).
    Volume, taper, and related tables for Southwestern
    ponderosa pine. U. S. Forest Serv. Res. Pap. RM-2,
    24 p. Rocky Mt. Forest and Range Exp. Stn., Fort
    Collins, Colo. 80521.

Presents volume tables, taper tables, and the distribu-
tion of tree volumes among the logs of saw log trees.
Volumes are in total cubic feet and cubic feet to a
variable top. Tree heights are in feet and numbers of
logs.

Keywords: *Pinus ponderosa*, forest measurement, tree
    volume tables.